

**REMARKS**

**I. Introduction**

In response to the pending Office Action, Applicants have amended claim 1 to further clarify the subject matter of the present disclosure. Claim 2 has been cancelled, without prejudice. No new matter has been added.

Applicants respectfully submit that all pending claims are patentable over the cited prior art for the reasons set forth below.

**II. The Rejection of Claims 1, 2, 4, 6 and 8 Under Res Judicata**

Claims 1, 2, 4, 6 and 8 stand rejected under *res judicata* as having been previously adjudicated by the Board of Appeals. The Examiner alleges that because claims 3, 5 and 7 were adjudicated in the Appeal to the Board, then the claims are rejected as having already been adjudicated. As the claims have been amended to include limitations that have not been previously adjudicated, Applicants respectfully submit that the *res judicata* rejection is now moot.

**III. The Rejection Of Claims 1, 2, 4, 6 and 8 Under 35 U.S.C. § 103**

Claims 1, 2, 4, 6 and 8 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Yamashita et al. (USP No. 6,287,720) in view of Fujiwara et al. (USP No. 6,576,366) and Shi et al. (US 2005/0014063); claims 1, 2, 4 and 8 as being unpatentable over Miyasaka (USP No. 5,869,208) in view of Nakamizo et al. (US 2001/0004502) and Shi; and claim 6 as being unpatentable over Miyasaka in view of Shi and further in view of Susuki et al. (US 2002/0037450). Applicants respectfully traverse these rejections for at least the following reasons.

With regard to the present disclosure, amended independent claim 1 recites a lithium secondary battery comprising a positive electrode comprising a composite lithium oxide, a negative electrode comprising a material capable of absorbing and desorbing lithium, a separator interposed between the positive electrode and the negative electrode, and a non-aqueous electrolyte. The separator comprises a non-woven fabric having a melt-down temperature of 150°C or more. A porous film having a thickness of not less than 3  $\mu\text{m}$  and not more than 10  $\mu\text{m}$  adheres to the surface of the positive electrode and/or the negative electrode. The non-woven fabric has a thickness of not less than 15  $\mu\text{m}$  and not more than 25  $\mu\text{m}$ , a total thickness of the porous film and the non-woven fabric is not less than 18  $\mu\text{m}$  and not more than 30  $\mu\text{m}$ . The non-woven fabric comprises an inorganic oxide filler and a binder.

It is admitted that Yamashita fails to teach or suggest the claimed thicknesses of the non-woven fabric and the porous film layer. However, the Examiner has found that the combined thickness of the separator 13A, 13B in Example 6 is 25  $\mu\text{m}$ . From this, the Examiner alleges that the portion of the separator 13A is a heat resistant layer falling in the claimed thickness of 0.5 to 20  $\mu\text{m}$ , and the portion 13B being a non-woven fabric falling in the claimed thickness of 15-50  $\mu\text{m}$ . Moreover, it is also admitted that Miyasaka fails to specifically teach or suggest the use of a non-woven fabric in the separator. However, it is alleged that it would be obvious to replace a non-woven separator for a woven separator in Miyasaka.

In response, Applicants would point out that regardless of the thickness of the entire separator described in Yamashita, there still is no teaching or suggestion of the thickness of the individual layers. Furthermore, as the drawings suggest that the two layers 13A and 13B are equal, they could not equal the different thicknesses of the claimed non-woven fabric (from 15-25  $\mu\text{m}$ ) and the heat resistant layer (3-10  $\mu\text{m}$ ) as the non-woven fabric thicknesses do not overlap

with those of the heat resistant layer, which they would have to do in order to be equal in thickness.

Furthermore, Applicants have amended claim 1 to recite that the porous film has a thickness of not less than 3  $\mu\text{m}$  and not more than 10  $\mu\text{m}$  and adheres to the surface of the positive electrode and/or the negative electrode, and that the non-woven fabric has a thickness of not less than 15  $\mu\text{m}$  and not more than 25  $\mu\text{m}$ . When the non-woven fabric is 15-25  $\mu\text{m}$ , the 1900 mAh design capacity can be maintained. Further, this provides for a high safety and capacity retention rate when used in conjunction with a heat resistant layer as recited in claim 1.

In contrast, as is shown in Comparative Example 1 of the present disclosure, when the separator is only a non-woven fabric with a thickness of 20  $\mu\text{m}$ , the defect rate is high (18%, see Table 2) and nail penetration safety tests fail (Table 2). Thus, a separator comprised of only a non-woven fabric in the claimed range will not be sufficient without the claimed heat resistant layer as well. Accordingly, one skilled in the art would not readily derive the claimed thicknesses of the separator based on the thickness of just the non-woven separator. Moreover, Miyasaka does not specifically disclose a non-woven fabric with a thickness of 5 to 30  $\mu\text{m}$ . As such, Applicants submit that Yamashita and Miyasaka do not render amended independent claim 1 obvious. Furthermore, Shi, Fujiwara and Nakamizo do not and are not relied upon to remedy this deficiency.

In order to establish *prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. As is clearly shown, Yamashita, Fujiwara, Miyasaka, Nakamizo and Shi do not disclose a lithium secondary battery comprising: a separator interposed between said positive electrode and said negative electrode; and a non-aqueous electrolyte, wherein said separator comprises non-woven fabric, at least one of said

positive electrode and said negative electrode has a porous film that is adhered to a surface thereof, said porous film has a thickness of not less than 3  $\mu\text{m}$  and not more than 10  $\mu\text{m}$ , the non-woven fabric has a thickness of not less than 15  $\mu\text{m}$  and not more than 25  $\mu\text{m}$ , a total thickness of the porous film and the non-woven fabric is not less than 18  $\mu\text{m}$  and not more than 30  $\mu\text{m}$ , and said porous film comprises alumina and a binder. Therefore, Applicants submit that Yamashita, Fujiwara, Miyasaka, Nakamizo and Shi do not render amended independent claim 1 of the present invention obvious and accordingly, Applicants respectfully request that the § 103(a) rejection of claim 1 be withdrawn.

**IV. All Dependent Claims Are Allowable Because The Independent Claim From Which They Depend Is Allowable**

Under Federal Circuit guidelines, a dependent claim is nonobvious if the independent claim upon which it depends is allowable because all the limitations of the independent claim are contained in the dependent claims, *Hartness International Inc. v. Simplimatic Engineering Co.*, 819 F.2d at 1100, 1108 (Fed. Cir. 1987). Accordingly, as independent claim 1 is patentable for the reasons set forth above, it is respectfully submitted that all pending dependent claims are also in condition for allowance.

**V. Conclusion**

Having fully responded to all matters raised in the Office Action, Applicants submit that all claims are in condition for allowance, an indication of which is respectfully solicited.

**Application No.: 10/555,447**

To the extent necessary, a petition for an extension of time under 37 C.F.R. 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 500417 and please credit any excess fees to such deposit account.

Respectfully submitted,

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